CLEANING IMPLEMENT

Paulus Antonius Augustinus Höfte
Johannes Lambertus Maria Mensink
Leonard Joseph Keller, Jr.

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of U.S. Provisional Application No. 60/453,610, filed March 11, 2003.

TECHNICAL FIELD

The present invention relates to cleaning implements suitable for cleaning hard surfaces.

The present invention also relates to tools, which can be removably attached to a cleaning implement for facilitating the cleaning of a hard surface.

BACKGROUND OF THE INVENTION

The literature is replete with products capable of cleaning hard surfaces such as ceramic tile floors, hardwood floors, counter tops and the like. In the context of cleaning floors with a cleaning solution, numerous mopping devices and other cleaning implements are described which comprise a handle connected to a mop head. The mop head of conventional cleaning implements include a sponge, a cloth or strings of absorbent material, which can be immersed in a bucket containing the cleaning solution in order to simultaneously spread the cleaning solution and then remove the soiled solution from the surface to be cleaned. The user typically mixes a dose of a concentrated detersive solution with hot water into the bucket. The use of a warm cleaning solution is beneficial to remove tough stains or grease off the floor surface. However, these conventional implements are not ideal from a hygiene point of view since the user keeps dipping the mop head into the same bucket, which rapidly becomes saturated with the soiled solution. As a result, bacteria and soils are re-deposited on the floor surface. In addition, users have a tendency to overdose the amount of concentrated detersive solution needed for effective cleaning. Modern cleaning implements are used with disposable absorbent cleaning pads or wipes which can be removably attached to the mop head of the implement. These pads or wipes can be substantially dry and require the user to apply the cleaning solution on the surface to be cleaned. These implements typically have liquid delivery mechanism which can be actuated by the user when desired and which can be used with a reservoir containing a pre-dosed amount of cleaning solution. Examples of such pad and implement are respectively the SWIFFER WETJET® absorbent cleaning pad which can be used with the SWIFFER WETJET® cleaning implement sold by The Procter & Gamble Company. Other types of disposable absorbent cleaning pads or wipes are pre-impregnated with a cleaning solution and as such, can be used with cleaning

implements which do not have a liquid delivery mechanism. Examples of such pad and implement are respectively the SWIFFER WET® cleaning pad which can be used with the SWIFFER® cleaning implement sold by The Procter & Gamble Company. The disposable absorbent pads or wipes of the modern cleaning implements are able to trap soils and bacteria, and, as a result, offer a more hygienic way to clean hard surfaces. In addition, these modern cleaning implements are easy and convenient to use and also minimize the contact between the user and the soiled solution.

With either conventional or modern cleaning implements, it has been observed that some stains, such as dried food or grease, can be particularly difficult to remove from the floor surface and can require additional friction or abrasive force.

The addition of scrubbing or abrasive means to the implement is known in the art.

U.S. Patent 6,085,378 to Petner, granted July 11, 2000, describes a retractable string mop having a scrubbing strip attached to the mop head of the implement. The mop head of this implement is fixedly attached to a handle. When removal of tough stains requires the use of the scrubbing strip, the user can retract the strings of absorbent material within a sleeve and then scrub the stain off the floor.

U.S. Patent 6,178,581 to Lewis, granted January 30, 2001, describes a sponge mop (or butterfly mop) having a rectangular mop head fixedly connected to a handle such that the angle between the handle and the mop head is fixed. A brush having a plurality of bristles is removably attached to the leading edge of the mop head. When the user wishes to scrub the floor surface, he or she can simply rotate the mop head such that the brush faces the floor surface.

U.S. Patent 6,000,087 to Petner, granted December 14, 1999, describes a roller sponge mop having a scrubbing strip attached to a mop head which is fixedly attached to a handle. With this implement, the user needs to the sponge mop in order to be able to scrub the floor surface. The floor surface cannot be scrubbed unless the sponge is retracted.

The mop head of the previously discussed implements are both fixedly attached to the handle. Consequently, these implements are not as handy as modern implements having a mop head pivotably connected to a handle which allows the mop head to swivel around objects and reach underneath furnitures.

Moreover, the scrubbing member of these two "conventional" cleaning implements become soiled after only a few uses. If a user wishes to remove the scrubbing member from the mop head in order to rinse it, the user has to touch the soiled scrubbing member. In addition, these implements do not allow the user to use the scrubbing member independently from the implement without having to touch the bristles of the brush.

International Patent Application Serial No. WO 00/27271, to Policicchio et al., published May 18, 2000 and assigned to The Procter & Gamble Company, describes that a scrubbing strip

can be connected to one of the edges of the rectangular mop head of a cleaning implement. The scrubbing strip is preferably connected to the mop head such that it does not contact the floor surface during the cleaning operation but can contact the floor surface when needed. The mop head of this cleaning implement is pivotably connected to a handle in order to improve the maneuverability of the mop head during the cleaning operation. The handle of this implement includes a liquid delivery mechanism which can be actuated by the user. When for example, the scrubbing strip is located adjacent to the left edge of the mop head, a user can pivot the mop head such that the right portion of the mop head leans against the handle allowing the user to scrub the floor surface with the scrubbing member. This implement does not allow the user to use the scrubbing member independently from the implement without having to touch the soiled scrubbing member. In addition, since the mop head is pivotably, rather than fixedly, connected to the mop head, the mop head can swivel or tilt back and forth during the scrubbing operation and, as a result, can lead to a poor scrubbing performance.

While the prior art addresses the problem associated with the ability to remove tough stains from hard surfaces by providing cleaning implements with additional scrubbing strip or other brushes, the scrubbing tools which are disclosed are not optimal both from an hygiene point of view as well as a convenience.

As such, there remains a need for a cleaning implement including a scrubbing tool which can be removed from the implement with minimal contact between the hand of the user and the soiled scrubbing surface of the tool.

There remains also a need for a cleaning implement having a mop head pivotably connected to a handle, a cleaning tool such as a scrubbing tool connected to the mop head and a locking mechanism allowing the mop head to be temporarily maintained in a desired position during the scrubbing operation.

SUMMARY OF THE INVENTION

In one embodiment, a cleaning implement for cleaning a hard surface comprises a handle, a mop head, wherein said mop head is connected to said handle and a cleaning tool, wherein said cleaning tool comprises a grip portion, a head portion connected to said grip portion and a scrubbing portion having a inner and an outer surface, wherein said inner surface is connected to said head portion and wherein said cleaning tool is removably connected to said mop head.

In one embodiment, a cleaning implement for cleaning a hard surface comprises a handle, a mop head having a top and a bottom surface, a plurality of edges, wherein said mop head is pivotably connected to said handle via a universal joint having a first and a second rotational axis,

a cleaning tool, wherein said cleaning tool is adjacent to one of said edges of said mop head and a locking mechanism for releasably locking said mop head relative to said handle.

In one embodiment, a cleaning tool comprises a grip portion, a head portion having an outer surface, wherein said head portion is connected to said grip portion, and a scrubbing portion connected to said head portion, wherein said grip portion comprises a securing member for releasably securing said cleaning tool to the mop head of a cleaning implement.

All documents cited herein are, in relevant part, incorporated herein by reference; the citation of any document is not to be construed as an admission that it is prior art with respect to the present invention.

It should be understood that every maximum numerical limitation given throughout this specification will include every lower numerical limitation, as if such lower numerical limitations were expressly written herein. Every minimum numerical limitation given throughout this specification will include every higher numerical limitation, as if such higher numerical limitations were expressly written herein. Every numerical range given throughout this specification will include every narrower numerical range that falls within such broader numerical range, as if such narrower numerical ranges were all expressly written herein.

All parts, ratios, and percentages herein, in the Specification, Examples, and Claims, are by weight and all numerical limits are used with the normal degree of accuracy afforded by the art, unless otherwise specified.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is an isometric view of a cleaning implement according to the present invention;

Fig. 2 is a top view of a cleaning tool according to the present invention;

Fig. 3 is an isometric view of the cleaning tool of Fig. 2;

Fig. 4 is a side view of a cleaning tool;

Fig. 5 is a side view of another cleaning tool;

Fig. 6 is a side view of the cleaning tool of Fig. 4 with a cleaning implement during the scrubbing operation of a floor surface;

Fig. 7 is a side view of the cleaning tool of Fig. 5 with a cleaning implement during the scrubbing operation of a floor surface;

Fig. 8 is isometric view another cleaning tool;

Fig. 9 is isometric view another cleaning tool;

Fig 10 is a partial isometric view of a cleaning implement having two cleaning tools;

Fig 11 is a partial isometric view of a cleaning implement having a locking mechanism;

Fig 12 is a partial isometric view of a cleaning implement having another locking mechanism;

Fig 13 is a partial isometric view of a cleaning implement having another locking mechanism;

Fig 14 is a partial isometric view of a cleaning implement having a lockable universal joint;

Fig 15 is an exploded view of the lockable universal joint of Fig. 14;

Fig. 16 is a front view of the lockable joint of Fig. 14 shown in an unlocked position;

Fig. 17 is a front view of the lockable joint of Fig. 14 shown in a locked position;

Fig 18 is an exploded view another lockable universal joint which is lockable in two directions;

Fig 19 is a partial isometric view of a cleaning implement having another lockable universal joint;

Fig. 20 is an exploded view of the upper member of the universal joint of Fig. 19;

Fig. 21 is an isometric view of the upper member of the universal joint of Fig. 19;

Fig. 22 is a front view of the upper member of the universal joint of Fig. 19;

Fig. 23 is an isometric view of the lower member of the universal joint of Fig. 19;

Fig. 24 is an isometric view of the universal joint shown in Fig. 19 shown in an unlocked position;

Fig. 25 is an isometric view of the universal joint shown in Fig. 19 shown in a locked position;

Fig. 26 is a front cross-section view of the lower member of the universal joint of Fig. 19; and

Fig. 27 is an isometric view of a disposable pad or wipe attached to the mop head of a cleaning implement.

DETAILED DESCRIPTION OF THE INVENTION

While not intending to limit the utility of the cleaning implement and the cleaning tools described herein, it is believed that a brief description of their use will help elucidate the invention.

In heretofore conventional wet-mopping operations, the mop user requires a source of detersive liquid for application to the surface being cleaned by means of the mop head. Earlier practice was to dip the mop head into an external source of liquid, such as a bucket, optionally

wring-out the excess of liquid, and then apply the mop head to the surface with sufficient force to dislodge soil therefrom. Unfortunately, after repeated usage, the mop heads themselves, become dirty, unsanitary, unsightly and have to be removed and laundered. In addition, because the mop user dips the mop head into the bucket which rapidly contains a soiled solution, conventional mops tend to redeposit soils and bacteria onto the floor surface and, as a result, are not optimal from an hygiene point of view.

Modern mopping implements employ disposable wipes or absorbent pads, which are releasably affixed to the head of the mopping implement, and which can conveniently be discarded and replaced after soiling. Even more modern implements carry their own reservoir of detersive liquid, thereby greatly enhancing their usefulness and convenience. In use, the liquid is dispensed onto the surface being cleaned via a liquid delivery mechanism.

These implements are particularly convenient to remove superficial and/or "light" soils from a floor surface but can reveal themselves insufficient to remove tough stains from the floor surface.

As will be immediately appreciated, it becomes necessary to, somehow, releasably affix a scrubbing and/or abrasive tool to such an implement in order to facilitate the removal of tough stains. Moreover, from time-to-time, it is necessary to remove the scrubbing tool in order to rinse its scrubbing surface or dispose of it. In addition, it can be desirable to have a scrubbing tool which is removable from the implement in order to allow the user to use this scrubbing tool independently from the implement while limiting the contacts between the user's hand and the soiled scrubbing/abrasive surface. As will be seen from the disclosures herein this affixing-usage-removal-replacement sequence in a convenient and hygienic manner results in several problems whose solutions are non-trivial.

The first problem faced by the manufacturer is that a scrubbing/abrasive tool needs to be releasably connected to the cleaning implement. The scrubbing tool also needs to be designed such that it allows the user to use the scrubbing tool independently from the implement (such as for example to scrub areas which are difficult to reach when the scrubbing member is connected to the implement).

In addition, when a user wishes to remove tough stains with a scrubbing tool attached to a mop head pivotably connected to a handle, he or she needs to rotate the mop head such that the scrubbing surface is in contact with the stain and then rub the scrubbing surface against the stain. The pulling and pushing actions of the user on the handle during the scrubbing operation can result in the swiveling or tilting of the mop head. This swiveling or tilting of the mop head renders the scrubbing operation less convenient and reduces the scrubbing performance.

The foregoing considerations are addressed by the present invention, as will be clear from the detailed disclosures which follow.

Reference will now be made in detail to the present preferred embodiments of the invention, examples of which are illustrated in the accompanying drawings wherein like numerals indicate the same elements throughout the views and wherein reference numerals having the same last two digits (e.g., **20** and **120**) connote similar elements.

I. Scrubbing/abrasive tool

Referring to Fig. 1, a cleaning implement **10** comprising a removable cleaning tool **20** is represented.

In one embodiment, the cleaning implement **10** comprises a handle **30** connected to a mop head **40**. In a preferred embodiment, the handle **30** is pivotably connected to the mop head **40** via a universal joint **130** as it is well known in the art. The cleaning implement **10** can be used to clean a hard surface when a cleaning pad or wipe (not shown) is attached about the mop head. Optional but preferred features of the cleaning implement **10** are detailed in section III. in greater details.

Referring to Fig. 2, a removable cleaning tool **20** is represented

In one embodiment, the cleaning tool **20** comprises a grip portion **120** connected to a head portion **220**. The grip portion is preferably ergonomically designed such that it fits a user's hand. In one embodiment, the grip portion **120** has a length Lg between about 10 mm and about 120 mm, preferably between about 40 mm and about 80 mm and a width Wg between about 10 mm and about 100 mm, preferably between about 20 mm and about 50 mm. The head portion **220** has a length Lh between about 10 mm and about 50 mm, preferably between about 15 mm and about 30 mm and a width Wh between about 20 mm and about 140 mm, preferably between about 70 mm and about 120 mm.

In one embodiment, the cleaning tool **20** comprises a scrubbing portion **320** which is connected to the outer surface **1220** of the head portion **220**. By "scrubbing portion", it is meant any material or feature capable of loosening soils from a hard surface when the scrubbing portion is rubbed against the soil.

In one embodiment, the scrubbing portion **320** is made of a strip of abrasive or scouring material. In one embodiment shown in Figs. 2 and 3, the length Ls of the scrubbing portion **320** is between about 20 mm and about 140 mm, preferably between about 70 mm and about 125 mm, its width Ws is between about 10 mm and about 50 mm, preferably between about 15 mm and about 35 mm and its thickness Ts is between about 1 mm and about 20 mm, preferably between about 2 mm and about 10 mm. The scrubbing portion(s) typically used herein are composed of

materials often used for making scouring pads. Such materials are typically composed of polymer blends with or without specific abrasives. Typical polymers used include nylon, polyester and polypropylene or blends thereof. Nylon is the most preferred material since it provides greater stiffness and durability versus polyester and polypropylene. To increase mechanical scrubbing ability, abrasive materials can be combined with the polymers. For example, 3M Scotch Brite® scouring pads are composed of nylon fibers combined with silicon carbide and/or aluminum oxide and/or calcium carbonate as abrasives. Another suitable scrubbing material is the GLIT® MICROTRON® manufactured by The Katy Company. Depending on the degree of scrubbing desired, the abrasive level and type can be adjusted accordingly. Alternatively, for more surface-safe scrubbing, the adhesive scrubbing strips can be composed of only polymer or polymer blends combined with binders or curing adhesives without any abrasives.

One skilled in the art will understand that the size as well as the "hardness" (or degree of abrasiveness) of the abrasive material are selected in order to prevent that the hard surface is damaged during the scrubbing operation.

In one embodiment represented in Fig. 4, the head portion **220** is connected to the grip portion **120** such that the angle α between the top surface of the grip portion **120** and the head portion **220** is between about 10 and about 80 degrees, preferably between about 25 and about 65 degrees, more preferably between about 35 and about 55 degrees and even more preferably equal to about 45 degrees.

In a preferred embodiment represented in Fig. 5, the head portion **220** is connected to the grip portion **120** such that the angle α' between the top surface of the grip portion **120** and the head portion **220** is between about 100 and about 170 degrees, preferably between about 115 and about 155 degrees, more preferably between about 125 and about 145 degrees and even more preferably equal to about 135 degrees. In one embodiment, the outer portion of the head portion **320** is substantially flat. In a preferred embodiment, the outer surface of the head portion is curved. When the cleaning tool **20** is connected to the mop head **40**, the grip portion **120** of the tool is substantially parallel to the top surface of the mop head **40** which is itself substantially parallel to the floor surface. Consequently, during a normal cleaning operation (i.e. when the bottom surface of the mop head is used to wipe the floor as shown in Fig. 1), the angle between the floor surface and the head portion **220** is substantially equal to the angle between the grip portion **120** and the head portion **220**.

When the angle between the top surface of the grip portion **120** and the head portion **220** is less than about 90 degrees, a user can scrub the floor surface without having to remove the pad or wipe (not shown for clarity) by pivoting the mop head against the handle such that the head

portion faces the floor (i.e. by holding the handle at an angle between about 20 and 70 degrees relative to the floor surface) as shown in Fig. 6.

When the angle between the top surface of the grip portion **120** and the head portion **220** is greater than about 90 degrees, a user can scrub the floor surface without having to remove the pad or wipe (not shown for clarity) by pivoting the mop head against the handle and then rotating the handle of about 180 degrees about the longitudinal axis of the handle such that the head portion faces the floor (i.e. by holding the handle at an angle between about 20 and 70 degrees relative to the floor surface) as shown in Fig. 7.

Among other benefits, positioning the head portion **220** at an angle α or α' relative to the grip portion **120**, and therefore the floor surface, allows a greater portion of a scrubbing portion **320**, which is connected to the head portion **220**, to be in contact with the floor surface during the scrubbing operation. In addition, a curved head portion **220** enhances the scrubbing performance during the scrubbing operation. The cleaning tool **20** can be made of any suitable material such as metal, wood, plastic(s). In a preferred embodiment, the cleaning tool is made of Acrylonitrile-Butadiene-Styrene polymer and is molded as it is well know in the art.

In one embodiment, a scrubbing kit can be sold to consumers which include a cleaning tool **20** and/or at least two strips of abrasive material having different "hardness" characteristics. In one embodiment, each strip of abrasive material conveys information to the user indicating on what type of surface they can be "safely" used. Such information can be conveyed to the consumer by printing directly onto the abrasive strip the name of the surface and/or by using a color code. For example the color brown and white can indicate that it is safe to use the strip of abrasive material respectively on hardwood floors and ceramic tiles.

In another embodiment, the strip of scrubbing material is impregnated with a dye which gradually fades due to the friction between the strip and the hard surface in order to inform the user that it is time to replace the abrasive strip. An example of a suitable dye include indigotine as disclosed in U.S. Patent 4,802,255, to Breuer et al., which describes nylon monofilaments that include at least two colored regions, one of which is provided by a dye. The monofilaments are included in the bristles of toothbrushes and, as the toothbrush is used by the user, the color intensity of the dyed region changes in response to wear, providing an indication of when the toothbrush should be replaced.

The scrubbing portion **320** can be either permanently or releasably attached to the head portion **220** of the cleaning tool **20**. By "permanently attached" it is meant that the strip is torn if a user attempts to remove it from the head portion **220**. The scrubbing portion **320** can be permanently attached to the head portion **220** via any know process in the art such as heat bonding sewing, screwing or riveting, slided in place within a channel or via an adhesive. By

"releasably attached", it is meant that a user can easily remove the scrubbing portion **320** without excessive force and without substantially deteriorating the head portion **220** and/or the scrubbing portion. In one embodiment, the scrubbing portion **320** can be releasably attached to the head portion **220** via a pressure sensitive adhesive. The pressure sensitive adhesive is preferably selected such that the scrubbing portion **320** can be easily peeled off the head portion (due to the local shear force applied by the user on the strip) but maintains the strips connected to the head portion **220** during the scrubbing operation (since the frictional force is applied to a greater area of the strip). In one embodiment, the scrubbing strip **320** is releasably attached to the head portion **220** via hook fasteners extending outwardly from the head portion **220**. Non-limiting examples of hook fasteners include VEL LOCK™ manufactured by the Velcro Industries and the AX 220 from the Aplix Inc. In one embodiment, a plurality of hooks can be formed on the head portion during the manufacturing process. In a preferred embodiment, a strip of hook fasteners **1220** is attached to the head portion **220** such that the hooks extend from the head portion **220**. In this embodiment, a user can easily attach a strip of fibrous scrubbing material as it is well know in the art. When a scrubbing strip **320**, having parallel opposite sides, is attached to the head portion **220**, the angle between the outer surface of the strip **320** and the grip portion **120** or the floor surface is the same as the angle between the head portion **220** and the grip portion **120** or the floor surface.

In another embodiment represented in Fig. 8, the scrubbing portion **320** is a brush comprising a plurality of bristles **1320**. In one embodiment, the length of the brush is between about 20 mm and about 140 mm, preferably between about 70 mm and about 125 mm, its width is between about 10 mm and about 50 mm, preferably between about 15 mm and about 35mm and the length of its bristles is between about 3 mm and about 40 mm, preferably between about 5 mm and about 15 mm. In one embodiment, the bristles of the brush have a length of at least about 1 mm, preferably at least about 5 mm, more preferably at least about 10 mm. In one embodiment, the length of the bristles of the brush less than about 100 mm, preferably less than about 50 mm, more preferably less than about 30 mm. Such bristles are typically composed of polymer or polymer blends, with or without abrasives. In the context of brushes, bristles made of nylon again are preferred because of rigidity, stiffness, and/or durability. A preferred nylon bristle is commercially available from 3M Corp. under the trade name Tynex ® 612 nylon. These bristles show less water absorption versus commercial Nylon 66. Reducing the ability of the bristles of the brush to absorb water is beneficial since water absorption decreases bristle stiffness and recovery while impacting scrubbing ability. Non-limiting examples of materials suitable to make the bristles of the brush include Nylon 66, polyester, Polypropylene, cotton, brass, cocoa, or any combination thereof. Among other benefits, a brush having a plurality of bristles is capable of

reaching and loosening soil lodged within grout lines and the like, or more generally within the asperities of uneven surfaces. One skilled in the art will understand that the hardness of the bristles (i.e. their ability to flex or bend when compressed) as well as the length and thickness of the bristles should be chosen to provide good loosening of the soil without causing substantial damage to the hard surface being brushed. As previously discussed for the strip of abrasive material, a scrubbing kit can include at least two brushes having different characteristics depending on the kind of surface in need of scrubbing. The brush can also be permanently or releasably attached to the head portion as previously discussed. In one embodiment, the bristles can be affixed on a substrate which can be releaseably attached to the outer surface of the head portion of the scrubbing tool. In one embodiment, the bristles of the brush can be coated with a dye as previously discussed such that color intensity of the dyed region changes in response to wear, providing an indication of when the brush should be replaced.

One skilled in the art will understand that a user can very simply and conveniently hold any of the previously described cleaning tool **20** in his or her hand independently from the cleaning implement, in order to remove tough stains which are hard to reach with a cleaning implement such as corners of a room, or countertops.

In a preferred embodiment, a cleaning tool **20** is removably attachable to the cleaning implement **10**, preferably to the mop head **40** of the implement as shown in Fig. 1.

In one embodiment, the cleaning tool **20** is releasably secured to the top surface of the mop head **40** such that the grip portion **120** and/or the head portion **220** is elevated relative to the top surface of the mop head **40**. Among other benefits, elevating the cleaning tool **20** and as a result the scrubbing portion **320** reduces the possibility for the attachment layer of a cleaning pad or wipe (not shown) to get in contact and/or entangled with the scrubbing portion **320**. This configuration is particularly advantageous when the pad or wipe is releasably attached about the mop head **40** of the cleaning implement via mechanical means, such as attachment structures **340**, located on the top surface of the mop head. In a preferred embodiment, the distance between the bottom surface of the grip portion **120** and the top surface of the attachment structures **340** along the Z axis is between about 3 mm and about 30 mm, preferably, between 5 mm and 20 mm, more preferably between about 10 mm and about 15 mm.

In one embodiment, a cleaning tool **20** is removably attached to the mop head **40** such that the scrubbing portion **320** is not in contact with the hard surface during a "regular" cleaning operation (i.e., when the implement is used with a pad or wipe in the configuration shown shown in Fig. 1).

In one embodiment, the cleaning tool **20** is attached to the top surface of the mop head such that the head portion **220** is adjacent to one of the edges of the mop head **40**. In a preferred

embodiment, the head portion **220** is adjacent to one of the side edges **140A** or **140B** of the mop head. As previously discussed, a user can remove tough stains by rotating the mop head such that the scrubbing portion **320** faces the floor surface. The user can then scrub the stain off the floor surface by wiping back and forth the scrubbing portion **320** against the stain. One skilled in the art will understand that some cleaning solution is preferably applied onto the stain before the scrubbing operation. Once the soils are loosened, the user can simply absorb the soiled solution with the absorbent cleaning pad or wipe.

The cleaning tool **20** can be releasably attached to the top surface of the mop head via any method known in the art.

In a preferred embodiment, cleaning tool **20** comprises a securing mechanism for maintaining the cleaning tool **20** attached to the mop head **40** during the cleaning and scrubbing operations. Non-limiting examples of suitable securing mechanism include a strap of elastic material connected at both ends to the mop head to maintain the grip portion **120** in between the elastic strap and the mop head; a pair of straps which can be removably secured to each other via hook and loop fasteners, a projection (or clip) located at the bottom surface of the grip portion **120** for engaging a corresponding opening located on the top surface of the mop head (or *vice versa*); at least two projections extending from the top surface of the mop head such that the width Wg of the grip portion **120** is slightly greater than the distance between the two projection and can be forced fit in between these two projections; hook fasteners located at the bottom surface of the grip portion for mechanically engaging corresponding loop fasteners located on the top surface of the mop head (or *vice versa*); a pressure sensitive adhesive applied on the bottom surface of the grip portion; magnet(s) located at the bottom surface of the grip portion for magnetically attaching the grip portion **120** to a corresponding ferrous portion or magnet(s) (or *vice versa*) on the mop head; or a bolt extending from the mop head for passing through the grip portion of the tool which is then secured with a "butterfly nut" as it is well known in the art.

In one embodiment shown in Fig. 9, the grip portion **120** comprises at least one projection **1120** resiliently extending from the top surface of the grip portion **120**. The resilient property of the projection **1120** can be obtained via any method known in the art such as by cutting slits on the top surface of the grip portion **120** around a portion of the projection **1120** or by adding a spring mechanism in the form of a push-button. The grip portion **120** can be inserted on the side of the mop head through a first opening which is sufficiently large to receive the grip portion **120**. The mop head also comprises a second opening extending through the top portion of the mop head and positioned such that when the projection **1120** reaches the second opening, the projection extends through at least a portion of the second opening and maintains the cleaning tool **20** attached to the mop head. A user can remove the cleaning tool by simultaneously

depressing the projection **1120** and pulling the cleaning tool **20** out of the mop head. One skilled in the art will understand that the projection **1120** can also be located on one of the side surface of the grip portion **120** such that it can extend through a corresponding opening located on the side surface of the mop head and still provide the same benefits.

In a preferred embodiment (shown in Figs. 3 through 5), the cleaning tool **20** comprises a male portion **125** connected to the bottom surface of the grip portion **120** for engaging a corresponding female portion **240** on the mop head **40** as shown in Fig. 10. A user can simply attach or remove the cleaning tool **20** from the mop head **40** by inserting the male portion **125** within the female portion **240** or by pulling on the grip portion **120** and/or the hard portion **220** in order to pull the male portion out of the female portion **240**. In one embodiment, the male portion **125** comprises a first leg **1125** and a second leg **2125**. In one embodiment, the female portion **240** is formed by slits **1240, 2240** corresponding the first and second legs **1125, 2125**. In one embodiment, the first leg **1125** is connected to the bottom surface of the grip portion **120** such that it is substantially perpendicular to the bottom surface of the grip portion **120** (i.e., within the X-Z plane). In one embodiment, the second leg **2125** is connected to the first leg **1125** such that the first and second legs are located in different planes. In a preferred embodiment (shown in Fig. **3**), the second leg **2125** is substantially perpendicular to the first leg **1125** (i.e., the second leg is located within the X-Y plane). One skilled in the art will understand that in this embodiment, when the first and second legs **1125, 2125** are located within the corresponding slits on the mop head **40**, the only movement possible of the cleaning tool **20** is along the X axis. When the user wishes to scrub a tough stain as previously discussed, the frictional forces between the legs **1125** and **2125** and the mop head are preferably enough to overcome the weight of the cleaning tool **20**. As a result, the cleaning tool **20** remains attached to the mop head until the user overcomes these frictional forces to pull the cleaning tool **20** out of the slits **240**. When the cleaning tool **20** is located adjacent to one of the side edges of a mop head, one skilled in the art will understand that other configurations or orientations of the legs **1125** and **2125** relative to the X-Y and X-Z planes can be used and still provide the same benefits

II. <u>Lockable handle relative to a mop head</u>

In another aspect, the invention is directed to a cleaning implement having a handle pivotably connected to a mop head via a universal joint. By "universal joint", it is meant any joint known in the art which comprises at least two rotational axis allowing the mop head to swivel when a user rotate the handle. In one embodiment, the cleaning implement comprises a cleaning tool such as the one previously described.

In one embodiment, the cleaning implement comprises a locking mechanism for releasably maintaining the mop head against the handle, as well as for temporarily preventing the rotation of the mop head about at least one of the rotational axis of the universal joint. As previously discussed, when a user wishes to remove a tough stain off a floor surface, the user need to rotate the mop head in order to have the scrubbing portion of the cleaning tool oriented towards the floor surface. When the user rubs the scrubbing tool by pushing and pulling back and forth on the handle, the mop head can potentially swivel or tilt. This swiveling or tilting of the mop head during the scrubbing operation is due to the friction between the scrubbing portion of the scrubbing tool as well as the ability of the mop head to pivot relative to the handle because of to the universal joint and. This swiveling or tilting of the mop head during the scrubbing operation limits the scrubbing performance of the implement and renders the scrubbing operation less convenient. The ease of use of the implement, as well as its scrubbing performance are enhanced when the mop head is releasably maintained or locked substantially against the handle during the scrubbing operation as previously shown in Figs. 6 and 7.

In one embodiment, the locking mechanism comprises a first structure located on the mop head and capable of interacting with the handle and/or a second structure located on the handle.

In one embodiment shown in Fig. 11, a locking mechanism **61** comprises a clip structure **161** having a first arm **1161** and a second arm **2161**. The clip **161** which is connected to the top surface of the mop head **41**. In a preferred embodiment, the clip structure **161** is located on the top surface of the mop head **41** such that it is on the half portion of the mop head **41** relative to the handle **31** which is facing the edge of the mop head **41** where a cleaning tool **21** is located. For illustrative purposes only, if a cleaning tool is adjacent the left side edge of the mop head **41**, the clip **161** is preferably adjacent to the right side edge of the mop head **41**. On skilled in the art will understand that when the side of the mop head having the clip structure **161** is applied against the handle, a portion of the handle gets lodged in between the first and second arms **1161, 2161** of the clip structure **161**. The friction between the clip structure **161** and the handle maintains the mop head **41** in a locked position relative to the handle until enough force is applied directly or indirectly by the user, to overcome this friction.

In another embodiment shown in Fig. 12, the locking mechanism **61** comprises a protrusion **261** extending radially from the handle and which can engage a corresponding opening **141** on the mop head **41**. The protrusion **261** and corresponding opening **141** are preferably located respectively on the handle and the mop head such that the opening **141** is located on the half portion of the mop head **41** relative to the longitudinal axis of the handle which is opposite to the half portion of the mop head having the scrubbing tool **21**. One skilled in the art will

understand that the protrusion **261** can be located on the top surface of the mop head and the opening **141** can be located on the handle and still provide the same benefits.

In another embodiment shown in Fig. 13, the locking mechanism **61** comprises a magnet **241** connected to the top surface of the mop head **41** which is magnetically attachable to a piece of ferrous material **361** connected to the handle **31**. The piece of ferrous material **361** and the magnet **241** are preferably located respectively on the handle and the mop head such that the magnet **241** is located on the half portion of the mop head **41** relative to the handle which is opposite to the half portion of the mop head having the scrubbing tool **21**. One skilled in the art will understand that the location of the magnet and the piece of ferrous material **361** can be inverted and still provide the same benefit. One skilled in the art will understand that the piece of ferrous material **361** can be replaced by a second magnet as long as the location of the first magnet on the mop head and the second magnet on the handle as well as the orientation of their respective magnetic poles cause the mop head to be maintained against the handle. One skilled in the art will also understand that a piece of ferrous material **361** is not necessary of the handle **31** itself is made of a ferrous material. In a preferred embodiment, the piece of ferrous material is a plate of metal comprising a suitable amount of iron.

In one embodiment (previously shown in Fig. 10), a cleaning implement has a plurality of cleaning tool such as any of the tools previously discussed which can be adjacent to different edges of the mop head **41**. In this embodiment, the cleaning implement can have a plurality of locking mechanisms in order to temporarily maintain the mop head in a chosen position in order to selectively use one of the cleaning tools.

In one embodiment, the locking mechanism is integrated into the universal joint of the cleaning implement.

In one embodiment represented in Fig. 14, the cleaning implement **11** (shown without the upper portion of the handle for clarity) has the universal joint **51** which includes an upper member **151** rotatably connected to a lower member **251** about a rotational axis A-A. The upper member **151** is connected to the lower end of the handle and the lower member **251** is rotatably connected to the mop head **41** preferably adjacent to the center of the top surface of the mop head **41** such that it can rotates about a rotational axis B-B. In one embodiment, the rotational axis A-A and B-B are located in different planes. In a preferred embodiment, the rotational axis A-A is substantially perpendicular to the rotational axis B-B.

In one embodiment shown in Fig. 15, the upper member **151** of the universal joint **51** has a first support portion **1151** and a second support portion **2151** which are located in between a first support portion **1251** and a second support potion **2251** of the lower member **251**. In one

embodiment, the first support portion **1251** of the lower member **251** has a lip portion **3251** for engaging a corresponding lip portion **3151** formed on the upper member **151**. In one embodiment, the second support portion **2251** of the lower member **251** has a lip portion **4251** for engaging a corresponding lip portion (not shown) formed on the upper member **151**. In one embodiment, at least the lower member **251** of the universal joint **51** is made of a partially deformable material having good elastic properties. By "good elastic properties" it is meant that this material recovers substantially its original shape when pressure ceases to be applied. The upper member **151** is rotated such that the projection **3151** passes beyond the projection **3251**, the friction between the projection **3151** and projection **3251** prevents the upper member **151** from rotating back about the rotational axis A-A until enough force is applied directly or indirectly by a user to overcome the friction.

In one embodiment (previously shown in Fig. 14), the lower member **251** is rotatably connected to the mop head **41** such that the rotational axis B-B is substantially parallel to longitudinal axis C-C of the mop head. When the mop head **41** comprises a cleaning tool **21** connected to one of the side edges of the mop head **41**, the lip portion(s) **3251** is(are) preferably located on the side of the lower member **251** such that it is "facing" the side edge of the mop head which does not have the cleaning tool **11**.

In one embodiment represented in Fig. 16, the angle β between the line intersecting the rotational axis A-A and including the tip of the lip portion **3251** and the longitudinal axis of the handle (when the handle is substantially perpendicular to the mop head) is between about 30 and 120 degrees, preferably between 50 and 110 degrees, more preferably between 70 and 100 degrees. When a user wishes to temporarily lock or maintain the mop head about the handle, the user can rotate the handle and/or the mop head about the rotational axis A-A such that the lip(s) located on the lower member **251** engages and passes the lip(s) **3151** located on the upper member **151** of the universal joint **51** as shown in Fig. 17. One skilled in the art will understand that the position of the mop head **41** relative to the handle in a locked position depends on the angle β.

In one embodiment, the second support portion **2251** comprises a lip portion **4251** for engaging a second corresponding lip portion (not shown) formed on the upper member **151**. In one embodiment, the lip portions **3251** and **4251** are located on the same side of the lower member **251** relative to the plane perpendicular to the rotational axis B-B (as previously shown in Fig. 15). One skilled in the art will understand that the amount of force needed to lock and/or unlock the universal joint **51** depends on the extent the corresponding lip portions **3151** and **3251** overlap but also on the type of material chosen to make the lower and/or upper member **151** and **251**.

In one embodiment represented in Fig. 18, the lower member **251** has a first and a second lip portion **3251, 4251** for engaging a first corresponding lip portion **3151** and a second corresponding lip portion (not shown) formed in the upper member **151** such that the first and second lip portions **3251** and **4251** are located on opposite sides of the lower member **251** relative to the plane perpendicular to the rotational axis B-B. In one embodiment, both lip portions **3251** and **4251** are located on the first support member **1251**. In another embodiment (shown in Fig. **18**), the first lip portion **3251** is located on the first support **1251** member and the second lip portion **4251** is located on the second support member **2251**. Among other benefits, lip portions **3251** and **4251** located on opposite sides of the lower member **251** relative to the plane perpendicular to the rotational axis B-B enables a user to "lock" the mop head relative to the handle in two directions. In one embodiment (previously shown in Fig. 10), a cleaning implement includes two cleaning tools **21** connected to opposite side edges of the mop head such that a user can selectively use either one of these cleaning tools by rotating and locking the mop head relative to the handle (or the handle relative to the mop head). In one embodiment, the first cleaning tool is a scrubbing tool as previously described and the second cleaning tool can be either a scrubbing tool as previously discussed (i.e., scrubbing strip or brush) or a squeegee and/or carry an absorbent material.

In one embodiment represented in Fig. 19, the cleaning implement **12** (shown without the upper portion of the handle for clarity) has the universal joint **52,** which includes an upper member **152** rotatably connected to a lower member **252** about a rotational axis A-A. The upper member **152** is connected to the lower end of the handle and the lower member **252** is rotatably connected to the mop head **42** such that it can rotates about a rotational axis B-B as previously discussed. In a preferred embodiment, the universal joint is adjacent to the centered portion of the top surface of the mop head **42.**

In one embodiment shown in Figs. 20 through 22, the upper member **152** of the universal joint has a first support portion **1152** and a second support portion **2152** which are located in between a first support portion **1252** and a second support potion **2252** of the lower member **252** (shown in Fig. 23). The first support portion **1152** includes a groove **3152** for receiving a pin **62** extending beyond the groove **3152**. The pin **62** is preferably at least partially deformable and is made of a material having good elastic properties. In a preferred embodiment, the pin is made of spring-steel. The first support portion **1152** also includes a recess **4152** having an arc shape and which is adjacent to the outer edge of the first support portion **1152**. In a preferred embodiment, the recess **4152** has a semi-circular shape. As previously discussed, a segment of the pin **62** extends beyond the groove **3152** and within the recess **4152** such that the pin **62** divides the recess

4152 into a first and a second portion **4152**A and **4152**B (shown in Fig. 22). In one embodiment, the pin **62** can "flex" within the recess **4152**.

In one embodiment shown in Fig. 23, the inner surface of the first support portion **1252** of the lower member **252** includes a projection **72** extending towards the second support portion **2252** of the lower member **252**. In a preferred embodiment, the projection **72** has generally a dome shape. This projection **72** can be formed during the molding process of the lower member **252** or can be formed independently and then attached to the support portion **1252**. When the upper member **152** is rotatably connected to the lower member **252** to form the universal joint **52**, part of the projection **72** is located within the recess **4152**. The upper and lower members **152** and **252** can rotate freely about the rotational axis A-A when the projection **72** is located within the first portion **4152**A until the pin **62** abuts the projection **72**. The universal joint **52** is shown in the "unlocked" position in Fig. 24. Since the pin is made of deformable material, one skilled in the art will understand that when enough pivoting force is applied on the handle and/or the mop head, the pin **62** is able to pass over the projection **72**. When the pin **62** passes over the projection **72**, the projection **72** is "trapped" within the second portion **4152**B (i.e., in between the pin **62** and the end of the recess **4152**), as shown in Fig. **25**, and, as a result, the universal joint **52** is locked. The universal joint **52** remains locked until enough pivoting force is applied on the handle and/or mop head such that the projection **62** returns within the first portion **4152**A. One skilled in the art will understand that the "locking" angle between the handle and the rotational axis B-B is determined by the location of the projection **72** on the inner surface of the first support portion **1252** of the lower member **252**.

In one embodiment, the angle γ (shown in Fig. 26) between the line which is orthogonal to the rotational axis A-A and located within the plane of the inner surface of the first support portion **1252** and the line which is orthogonal to the rotational axis A-A and which includes the center of the projection **72** is at least about 60 degrees, preferably between about 75 and about 110 degrees, more preferably between about 85 and about 100 degrees. One skilled in the art will understand that if the projection **72** is located on the inner surface of the support portion **1252** such that the angle γ is less than about 60 degrees, the handle will abut against the edge of the mop head before the pin **62** has had a opportunity to "jump" over the projection **72**.

One skilled in the art will also understand that the pin **61** can be made of a substantially rigid material and the projection **72** can be made of a partially deformable material and still provide the same benefits. The projection **72** can also be resiliently attached to the support portion **1252** and include a spring-loaded mechanism (such as a ball and spring mechanism.

In one embodiment, the second support portions **2152** and **2252** also include a groove, a pin, a recess and a projection as previously described such that the universal joint is lockable in a

second position as previously discussed. When this lockable universal joint is used to pivotably connect a handle to a mop head including two cleaning tools **21** connected to opposite side edges of the mop head, a user can selectively use either one of these cleaning tools by rotating and locking the mop head relative to the handle.

An additional benefit of the locking mechanisms previously described is that they reduce the storage space of the implement when the mop head is maintained against the handle. The implement can be stored such that only one of the edges of the mop head, rather than its bottom surface, is in contact with the floor. A user can also very simply hang the implement with the mop head maintained against the handle and, consequently, save some storage space.

III. Optional features of the cleaning implement.

The previously described cleaning tools and locking mechanisms, can be used with either a cleaning implement carrying a reservoir of cleaning solution connected to a liquid delivery mechanism or with a cleaning implement which does not have a liquid delivery mechanism.

The liquid delivery mechanism can be any mechanism known in the art.

Non-limiting examples of liquid delivery mechanism include electrically power pump, pressurized hand pump, aerosol mechanisms or gravity mechanism, such as the ones described in International. patent application serial No. WO 01/22861, to Kunkler et al., published April 5, 2001, in International patent application Serial No. WO 00/27271, to Policicchio et al., published May 18, 2000, in U.S. Patent 5,779,155 to Ping et al., granted July 14, 1998, and in copending U.S. patent application serial No. 60/409,263 to Höfte et al filed September 9, 2002, all assigned to The Procter & Gamble Company.

The liquid delivery mechanism is preferably in fluid communication with a nozzle connected to the implement and which is preferably located on the top surface of the mop head. The liquid delivery mechanism can be actuated by a user by pulling or pushing on a trigger member which is preferably located on the upper portion of the handle.

As previously discussed, cleaning implements which carry a reservoir filled with a cleaning solution, are preferably used with substantially dry absorbent cleaning pads and/or wipes. One example of such a disposable pad releasably attached to the substantially rectangular mop head of a cleaning implement is represented in Fig. 27. An absorbent cleaning pad or wipe **70** can be removably attached about the mop head of the implement such that it is in contact with the floor surface during the cleaning operation. The absorbent pad and/or wipe can be releasably attached about the mop head via any mechanism know in the art. Non-limiting examples of such mechanisms include grippers (shown in Fig. 10) located on the top surface of the mop head which

comprises a plurality of pie-shaped structures as described in U.S. Patent 6,305,046 to Kingry et al., granted October 23, 2001, as well as hook or loop fasteners located on the mop head to engage loop or hook fasteners located on the pad and/or wipe as described in International patent application Serial No. WO 00/27271, to Policicchio et al., published May 18, 2000. One skilled in the art will understand that when a disposable pad or wipe is attached to attachment structures located on the top surface mop head and when the mop head includes a nozzle **80** for dispensing the cleaning solution which is adjacent to the front edge of the mop head, the disposable pad or wipe preferably comprises a notch **170** on at least one of the edges of the pad or wipe, preferably on both the front and back edges of the pad **70**. The notch allows the nozzle to dispense the cleaning solution on the hard surface without being obstructed by the pad or wipe. The use of such a notch is disclosed in International Patent Application Serial No. WO 00/27271, to Policicchio et al., published May 18, 2000.

The substantially dry absorbent cleaning pad and/or wipe can be made of any absorbent material known in the art and preferably include a superabsorbent material as described in International patent application Serial No. WO 00/27271, to Policicchio et al., published May 18, 2000 or in U.S. patent application serial No. 60/423,484 to Policicchio et al., filed November 4, 2002, all assigned to The Procter & Gamble Company. Non-limiting examples of suitable cleaning pad include the SWIFFER WETJET® cleaning pad sold by The Procter & Gamble Company, the CLOROX READY-MOP® cleaning pad sold by The Clorox Company or the GRAB-IT GO-MOP™ cleaning pad sold by The S. C. Johnson Company.

The previously described cleaning tools and lockable mechanisms can also be used with cleaning implements which do not include a liquid delivery mechanism. An example of such an implement is the SWIFFER® cleaning implement sold by The Procter & Gamble Company. This type of implement can either be used with a substantially dry absorbent pad and/or wipe as previously discussed but it is preferably used with a pre-moistened cleaning pad and/or wipe. Non-limiting examples of pre-moistened pads/wipes are the SWIFFER WET® cleaning pad sold by the Procter and Gamble Company and the Pledge Grab-it™ Wet Floor Wipes sold by The S. C. Johnson Company. Suitable pre-moistened cleaning wipes/pads are described in U.S. Patent Application 09/671,718 to Sherry et al., filed September 27, 2000, in U.S. Patent Application 10/267,186 to Barnabas et al., filed October 9, 2002, in U.S. Patent Application 60/328,008 to Barnabas et al., filed October 9, 2001 and in U.S. Patent Application 10/349,733 to Sherry et al., filed January 23, 2003, all assigned to The Procter & Gamble Company.

While particular embodiments of the subject invention have been described, it will be apparent to those skilled in the art that various changes and modifications of the subject invention can be made without departing from the spirit and scope of the invention. In addition, while the

present invention has been described in connection with certain specific embodiments thereof, it is to be understood that this is by way of limitation and the scope of the invention is defined by the appended claims which should be construed as broadly as the prior art will permit.